Problems of metrological provisions for nonstandard measuring equipment (ME) were recently widely discussed in the press, at conferences, seminars, and meetings. This measuring equipment, which is developed for specialized measurements and testing, used in given industries or separate enterprises, and produced as individual specimens or in single batches, is not subject to compulsory state testing according to the All-Union State Standard (GOST) 8.001-71 [1]. Neither have any other methods been established for inspecting and testing metrologically its development and manufacture. Therefore, this measuring equipment is brought into use without a trustworthy evaluation of its metrological characteristics or due metrological provisions intended to guarantee the maintenance of its metrological characteristics at the required level in the course of its utilization. Nevertheless, nonstandard measuring equipment is often used for various vital measurements in scientific-research investigation and experimental-design work, in the course of testing and controlling production processes, as well as testing and checking the quality of finished products. In this connection the establishment of a procedure for developing, manufacturing, and bringing into use such equipment with the required technical level and quality has become a pressing problem.

At present this problem is solved in a number of industries by compiling and approving trade, association, and plant standards, trade methodic directives, and other normalizing documents which specify the procedure for supervising the development, manufacture, and utilization of nonstandard measuring equipment, as well as its metrological certification and testing. However, although these documents are aimed at attaining the same objective, namely, providing uniform measurements, their organizational methodological, and technical solutions are characterized by their considerable diversity which is not always justified by the specific conditions of the trade or enterprise.

The All-Union Scientific-Research Institute of the Metrological Service (VNIIMS) is completing the drafting of the standard on "State system for providing uniform measurements. Metrological provisions for developing, manufacturing, and utilizing nonstandard measuring equipment. Basic regulations," which is intended to eliminate these deficiencies and establish the foundation for ensuring uniform basic regulations on metrological provisions for nonstandard measuring equipment.

It is stated in the draft standard that the metrological provisions for developing, manufacturing, and utilizing nonstandard measuring equipment are aimed at regularizing the nomenclature of measuring equipment used in the national economy, providing it with the required metrological characteristics, and maintaining it in permanent readiness for measurements with the specified precision. This is attained by compulsory coordination with the metrological service of the technical assignments for developing nonstandard measuring equipment, metrological examination of the design and technological documents on the ME development, and metrological certification of the produced measuring and equipment, as well as state supervision and departmental inspection of its condition and application. The degree to which the state and departmental metrological services should participate in this work and procedure for its implementation are determined in the draft standard in accordance with the intended purpose of the nonstandard measuring equipment application.

Coordination with the metrological service of the technical assignments for developing nonstandardized measuring equipment should ensure technical and economic substantiation for developing this equipment and eliminate the designing of special measuring equipment when equipment produced by the instrument-making industry can be used. In coordinating technical tasks it is also necessary to establish whether the developed measuring equipment's specified
characteristics correspond to up-to-date levels of instrument making, and the precision requirements and measurement conditions for which this equipment is intended. It is very important that in coordinating the technical tasks the possibility for testing the developed measuring equipment's metrological characteristics in the course of its manufacture and utilization should be established, or a requirement for such testing included in the technical tasks.

The draft standard stipulates that the technical tasks for developing nonstandard measuring equipment intended for use as reference equipment and for measurements related with environmental protection should be subject to coordination with the metrological institutes or the State Committee of Standards (Gosstandart) centers of metrology and standardization which correspond to the equipment's specialization. This requirement is made because it is precisely such metrological organizations that possess the most complete data on metrological provisions for the corresponding equipment, on the level of existing and future requirements for its development and improvement, as well as on existing or planned ME development. Therefore, these organizations will be able to evaluate most completely whether it is advisable to develop the given special measuring equipment and whether the specified technical requirements are adequate and substantiated.

Technical tasks for the development of the remaining nonstandard measuring equipment should be coordinated with the departmental metrological services.

Metrological examination of the nonstandardized measuring equipment's design and technological documents carried out by the metrological service agencies in addition to the tasks specified in GOST 8.103−73 [2] should establish whether the metrological characteristics of the developed measuring equipment subject to testing in the course of manufacture and utilization are mentioned and adequate, and whether metrological certification techniques are provided for this equipment. In the course of this examination it is also necessary to establish whether the above documents specify the means and methods for testing the developed equipment, including the application of existing techniques and reference measuring equipment or, if they cannot be used, the development of new testing techniques as well as design and technological documentation for reference measuring equipment which should be produced.

The draft standard stipulates that the state metrological service agencies should examine metrologically the design and technological documents for the nonstandardized measuring equipment whose technical tasks are coordinated during its development. An exception is made for documents referring to the nonstandardized measuring equipment intended for use by departmental metrological services as subordinate reference equipment. Such measuring equipment should be examined metrologically by the principal and local departmental metrological service organizations. The duties of examining metrologically the design and technical documentation for the remaining nonstandardized measuring equipment is assigned by the draft standards to departmental metrological services.

The most important measure which to a considerable extent determines efficiency in applying the produced nonstandardized measuring equipment consists of metrological certification. The draft standard stipulates that metrological certification of the nonstandardized measuring equipment is carried out for the purpose of establishing whether its metrological properties correspond to the technical tasks set by the specifications and standards of the State System for Ensuring Uniform Measurements (GSI) and also for refining metrological characteristics of the measuring equipment subject to testing during utilization, and the techniques and periodicity for testing the equipment submitted by the developers.

Metrological certification of nonstandardized measuring equipment subject to compulsory state testing is assigned by the draft standard to the state metrological service agencies, and the certification of the remaining measuring equipment to the departmental metrological services.

The ME investigation technique used in its metrological certification, as well as the required technical means for this purpose and, therefore, the potentialities of metrological organizations for providing the required level of metrological certification are determined by the complexity, precision, and other characteristics of the certified object, namely the nonstandardized measuring equipment. Therefore, it is impossible to establish beforehand, in the standard, which state metrological service agency is the most suitable for certifying a given measuring instrument. Moreover, it is impossible to expect every nonstandardized measuring-equipment developing organization and manufacturing plant always to know precisely.